File/24 hr. clock mvmt

CONFIDENTIAL

13 November 1957

MEMORANDUM FOR THE RECORD

SUBJECT: Trip to Frankford Arsenal

1. On 30 October 1957 the undersigned visited Frankford Arsenal to investigate the progress made on the 24-hour clockwork project and the .38 caliber [redacted]. 25X1

2. Mr. D. Marcello has completed the initial testing of twenty 24-hour clockworks. These mechanisms were tested in the as received condition, and they were run the face up position. The purpose of this initial phase of testing was to establish how these units perform after storage for 2½ years. The results are detailed on the attached sheet. Generally it can be said that the clockworks showed a high incidence of failure at low temperatures. This performance definitely shows deterioration of the mechanisms when stored for prolong periods of time. Whether this deterioration is strictly a lubrication problem has to be determined. Mr. Marcello will disassemble several samples of clockworks which failed more than once in the tests just completed to attempt to attribute the failures to specific causes.

3. A tentative testing program has been set up to establish the best lubricant for the 24-hour clockwork. Three lubricants are to be tested: Convolube "A", a spreading type oil; N-22A, a non-spreading type oil; FA-434, a spreading oil. It is not possible to predict which lubricant is going to be the superior, because the viscosity of the oil at the bearings and the torques required depend greatly on the geometry of the bearing system.

It has been planned to clean, relubricate, and rate fifteen of the twenty mechanisms which just finished the preliminary tests. The fifteen will be broken down into three groups, and they will be lubricated with the three oils of interest. The fourth group of five units will be run as is to function as data control. The 20 units will be run at room temperature first. The mechanisms will be run four separate times giving four complete sets of room temperature data. The same procedure of four complete runs will be carried out at -40°F. If the performance is good at -40°F, the test will be repeated at -50°F. If the mechanisms show a high incidence of failure at -40°F the units will be run at -30°F. Four complete runs with all mechanisms at the same single temperature will provide 80 readings at that temperature. The high temperature test phase will be undertaken with four runs at 160°F. It is not anticipated that the units will experience failures to function at high temperatures. The clockworks will then be stored at +160°F for 3 weeks and then run four times at +160°F. This test is to attempt to obtain data on accellerated aging effects.

Mr. Messina and Mr. Marcello feel that the above program should indicate a clear cut superiority of one lubricant. It should be possible to an intelligent decision on the lubricants with the data obtained

[redacted] 25X1

CONFIDENTIAL

4. As of the date of the undersigned's visit approximately $1,000.00 is left for the above work. Mr. Marcello feels this sum should be sufficient to cover the testing program and written report.

25X1

The Arsenal personnel are presently planning to run tests with a slug made of "Mallory Alloy", which is a sintered tungsten carbide material. This metal has very high density, and the new slug will weigh approximately 100 grains. The forecast muzzle velocity should be approximately 490 ft/second.

Tests to determine maximum effective range must be carried out before design finalization. The engineers are quite confident that the slug will be stable through the whole effective range.

It is the suggestion of the undersigned that [redacted] of this division visit the arsenal by the middle of December to determine final direction of the project. The Arsenal personnel will attempt to establish the cost of fabricating cartridges in small lots, so that prices can be quoted for lots of ammunition. It is reported that approximately $6000 of the original funds allocated to Frankford Arsenal remains. These funds should be sufficient to finish the work and provide a quantity of rounds if firm direction to the project is given during the closing stages to avoid wasted effort.

25X1

25X1

:mt

Results of Tests Run on Twenty, 24-Hour Clockwork Firing Devices

The following tests were run on the mechanisms in the as received condition with the clock faces up. The maximum allowable error is ±2%, or ±7 minutes per day.

Temperature	Stoppages	Number of Mechanisms Within Tolerance	Maximum Error in Minutes
-40°F	9	5	-20
-30°F	4	6	+25
-20°F	3	10	-17
-10°F	2	14	-11
0°F	1	16	-15
Room Temperature	0	19	-12
+140°F	2*	17	+8 min

* These two stoppages are a result of a failure of the lever to drop through the slot on the drum. The reason for this was to be investigated by Mr. Marcello.